What is claimed is:

1. An impulse radar antenna array comprising:
   a. a ground plane, comprising a first surface and a second surface; and
   b. a plurality of antenna elements affixed to said first surface, each of said plurality of antenna elements being adapted to emit and receive ultra wideband signals.

2. The impulse radar antenna array of claim 1, wherein said plurality of antenna elements comprises least one transmitting element.

3. The impulse radar antenna array of claim 1, wherein said plurality of antenna elements is disposed in parallel rows upon said first surface, said parallel rows comprising a transmitting row comprised of transmitting elements adapted to emit ultra wideband signals and a receiving row comprised of receiving elements adapted to receive ultra wideband signals impingent thereon.

4. The impulse radar antenna array of claim 3, wherein each of said plurality of antenna elements exhibits ultra wideband frequency responses with a radially equidistant phase front in substantially all directions.

5. The impulse radar antenna array of claim 3, wherein each of said plurality of antenna elements is a monoloop.

6. The impulse radar antenna array of claim 3, wherein said receiving elements are equal in number to said transmitting elements and disposed in said receiving row such that each of said receiving elements is aligned with respect to a corresponding transmitting element disposed in said transmitting row.

7. The impulse radar antenna array of claim 6, wherein each of said receiving elements is oriented upon said first surface with respect to said corresponding

transmitting element so as to create a symmetric product response with respect to aspect angle.

8. The impulse radar antenna array of claim 6, wherein said transmitting elements and said receiving elements are disposed in said parallel rows such that inter-element spacing is substantially unique for each neighboring pair of elements in said parallel rows.

9. The impulse radar antenna array of claim 8, wherein said inter-element spacing is in accordance to a Golomb's Ruler algorithm.

10. The impulse radar antenna array of claim 3, wherein said transmitting row and said receiving row further comprise electro-magnetically responsive elements such that the response patterns of each of said transmitting and receiving elements are substantially identical.

11. The impulse radar antenna array of claim 10, wherein said electro-magnetically responsive elements are dummy ultra wideband antenna elements.

12. The impulse radar antenna array of claim 11, wherein said dummy ultra wideband elements are positioned at the ends of each of said rows.

13. The impulse radar antenna array of claim 3, wherein said transmitting elements and said receiving elements are disposed in said parallel rows such that inter-element spacing is substantially unique for each neighboring pair of elements in said parallel rows.

14. The impulse radar antenna array of claim 13, wherein said inter-element spacing is in accordance to a Golomb's Ruler algorithm.

15. The impulse radar antenna array of claim 3, wherein said antenna elements are affixed to said first surface such as to effect a horizontally polarized electromagnetic response.

16. The impulse radar antenna array of claim 3, wherein said antenna elements are affixed to said first surface such that each of said elements in each of said rows is obliquely oriented with respect to a neighboring element within said row.

17. The impulse radar antenna array of claim 3, wherein said transmitting row is disposed along a line parallel to a longitudinal axis of said first surface such that said each transmitting element comprising said transmitting row is alternatingly displaced laterally from said line.

18. The impulse radar antenna array of claim 17, wherein said receiving row is disposed along a line parallel to a longitudinal axis of said first surface such that said each receiving element comprising said receiving row is alternatingly displaced laterally from said line.

19. The impulse radar antenna array of claim 18, wherein said antenna elements are affixed to said first surface such that each of said elements in each of said rows is obliquely oriented with respect to a neighboring element within said row.

20. The impulse radar antenna array of claim 3, further comprising a radio frequency fence structure disposed along the longitudinal axis of said plane between said transmitting row and said receiving row.

21. The impulse radar antenna array of claim 3, wherein said plane comprises rolled edges.

22. The impulse radar antenna array of claim 3, wherein each of said plurality of antenna elements comprises a tab.

23. The impulse radar antenna array of claim 22, further comprising a plurality of wave guides disposed upon and co-planar with said second surface coupled to each of said plurality of antenna elements through said ground plane via said tabs.

24. The impulse radar antenna array of claim 23, wherein said plurality of wave guides is comprised of transmission wave guides coupled to each of said transmitting elements, and receiving wave guides coupled to each of said receiving elements.

25. The impulse radar antenna array of claim 24, wherein each of said transmitting wave guides is of substantially unique length.

26. The impulse radar antenna array of claim 25, wherein any of said receiving wave guides coupled to any of said receiving elements is equal in length to the transmitting wave guide coupled to the corresponding transmitting element.

27. The impulse radar antenna array of claim 3, further comprising a radome, said radome comprising a surface, a departure said departure describing a hollow such that when overlaying said transmitting row, radiated energy from said transmitting row is normal to said hollow.

28. The impulse radar antenna array of claim 27, wherein said radome is comprised of a low density, low dielectric, thermo/vacuum-formable material.

29. The impulse radar antenna array of claim 27, wherein said radome further comprises an acoustic damping means.

30. The impulse radar antenna array of claim 27, wherein said radome further comprises at least one stand-off.

31. The impulse radar antenna array of claim 30, wherein said stand-off is comprised of acoustic damping material.

32. An impulse radar antenna array comprising:

a. a ground plane, said ground plane having an axis, a first surface and a second surface;
b. a transmitting row comprised of transmitting antenna elements affixed to said surface parallel to said axis, said transmitting antenna elements enabled to radiate ultra wideband signals; and
c. a receiving row comprised of receiving antenna elements affixed to said first surface parallel to said axis, said receiving antenna elements adapted to receive ultra wideband signals impingent thereon.

33. The impulse radar antenna array of claim 32, wherein said transmitting elements and said receiving elements are disposed within said transmitting row and said receiving row, respectively, such that inter-element spacing is substantially unique.

34. The impulse radar antenna array of claim 33, wherein said inter-element spacing is in accordance with a Golomb's Ruler algorithm.

35. The impulse radar antenna array of claim 33, further comprising a plurality of co-planar wave guides affixed said second surface, each of said plurality of wave guides being coupled to each transmitting antenna element and to each receiving antenna element through said ground plane and wherein each of said antenna elements comprises a feed tab for coupling to said wave guides.

36. The impulse radar antenna array of claim 35, wherein said wave guides coupled to said transmitting antenna elements are of substantially unique lengths.

37. The impulse radar antenna array of claim 36, wherein each of said wave guides coupled to said receiving antenna elements is equal in length to a wave guide coupled to said transmitting antenna elements.

38. The impulse radar antenna array of claim 37, further comprising a fence structure between said transmitting row and said receiving row.

39. The impulse radar antenna array of claim 38, wherein said fence structure describes a curvi-linear surface.

40. The impulse radar antenna array of claim 39, wherein said radome further comprises at least one stand-off.

41. The impulse radar antenna array of claim 38, wherein said ground plane comprises at least one means to reduce backlobe radiation.

42. The impulse radar antenna array of claim 41, wherein said means of reducing backlobe radiation is rolled edges of said ground plane.

43. The impulse radar antenna array of claim 42 wherein said radome further comprises a cylindrical departure, said cylindrical departure adapted to receive said transmitting row in a hollow formed by said first cylindrical departure such that signals radiating therefrom strike said departure at a normal angle.

44. The impulse radar antenna array of claim 43, wherein said transmitting antenna elements are oriented upon said ground plane with respect to said

receiving antenna elements such as to create a symmetric product response in the azimuthal plane.

45. The impulse radar antenna array of claim 44, further comprising a dummy element affixed to said ground plane at each end said transmitting row and said receiving row.

46. The impulse radar antenna array of claim 45, wherein said transmitting antenna elements and said receiving antenna elements are affixed to said ground plane such as to effect a horizontally polarized response.

47. The impulse radar antenna array of claim 41, wherein said means of reducing backlobe radiation is non-linear edges of said ground plane.

48. The impulse radar antenna array of claim 41, wherein said means of reducing backlobe radiation is fence structures mounted to the edges of said ground plane.

49. The radar antenna array of claim 41wherein said means of reducing backlobe radiation is a ground plane comprising serrations of the edges of said ground plane.

50. A method for using an antenna array, said antenna array being comprised of a row of transmitting antenna elements and a row of receiving antenna elements parallel to said row of transmitting antenna elements, said receiving antenna elements being arrayed such that any receiving antenna element comprising said row of receiving antenna elements is aligned with a corresponding transmitting antenna element in a plane perpendicular to said transmitting and receiving rows and a means for controlling signal emission from each transmitting antenna element and signal reception to each receiving antenna element, comprising the step of receiving via any of said receiving antenna

elements a signal emitted from any non-corresponding transmitting antenna element.

51. The method according to claim 50, further comprising the step of receiving via a receiving antenna element a signal emitted from said corresponding transmitting antenna element.

52. A method for using an antenna array, said antenna array being comprised of a row of transmitting antenna elements and a row of receiving antenna elements parallel to said row of transmitting antenna elements, said receiving antenna elements being arrayed such that any receiving antenna element comprising said row of receiving antenna elements is aligned with a corresponding transmitting antenna element in a plane perpendicular to said transmitting and receiving rows and a means for controlling signal emission from each transmitting antenna element and signal reception to each receiving antenna element, comprising the steps of:

a. emitting a signal from at least one transmitting antenna element; and
b. receiving said signal by at least one non-corresponding receiving antenna element.

53. The method according to claim 52, further comprising the steps of:
a. emitting a signal from at least one transmitting antenna element; and
b. receiving said signal by a corresponding receiving antenna element.

54. A radar antenna array comprising:
a. a ground plane, said ground plane having an axis, a first surface and a second surface;
b. a transmitting row comprised of transmitting antenna elements affixed to said surface parallel to said axis; and

c. a receiving row comprised of receiving antenna elements affixed to said first surface parallel to said axis.

55. The radar antenna array of claim 54, wherein said transmitting elements and said receiving elements are disposed within said transmitting row and said receiving row, respectively, such that inter-element spacing is substantially unique.

56. The radar antenna array of claim 55, wherein said inter-element spacing is in accordance with a Golomb's Ruler algorithm.

57. The radar antenna array of claim 55, further comprising a plurality of co-planar wave guides affixed said second surface, each of said plurality of wave guides being coupled to each transmitting antenna element and to each receiving antenna element through said ground plane and wherein each of said antenna elements comprises a feed tab for coupling to said wave guides.

58. The radar antenna array of claim 57, wherein said wave guides coupled to said transmitting antenna elements are of substantially unique lengths.

59. The radar antenna array of claim 58, wherein each of said wave guides coupled to said receiving antenna elements is equal in length to a wave guide coupled to said transmitting antenna elements.

60. The radar antenna array of claim 59, further comprising a fence structure between said transmitting row and said receiving row.

61. The radar antenna array of claim 60, wherein said fence structure describes a curvi-linear surface.

62. The radar antenna array of claim 59, wherein said radome further comprises at least one stand-off.

63. The radar antenna array of claim 59, wherein said ground plane comprises at least one means to reduce backlobe radiation.

64. The radar antenna array of claim 63, wherein said means of reducing backlobe radiation is rolled edges of said ground plane.

65. The radar antenna array of claim 63, wherein said radome further comprises a cylindrical departure, said cylindrical departure adapted to receive said transmitting row in a hollow formed by said first cylindrical departure such that signals radiating therefrom are incident said hollow at a normal angle.

66. The radar antenna array of claim 65, wherein said transmitting antenna elements are oriented upon said ground plane with respect to said receiving antenna elements such as to create a symmetric product response in the azimuthal plane.

67. The radar antenna array of claim 66, further comprising a dummy element affixed to said ground plane at each end said transmitting row and said receiving row.

68. The radar antenna array of claim 67, wherein said transmitting antenna elements and said receiving antenna elements are affixed to said ground plane such as to effect a horizontally polarized response.

69. The radar antenna array of claim 63, wherein said means of reducing backlobe radiation is non-linear edges of said ground plane.

70. The radar antenna array of claim 63, wherein said means of reducing backlobe radiation is fence structures mounted to the edges of said ground plan

71. The radar antenna array of claim 63, wherein said means of reducing backlobe radiation is a ground plane comprising serrations of the edges of said ground plane.